Tanta University Faculty of Engineering	(2013-2014) PME2111 Second year (Computer and Automatic Control)

Q (1) (25M)

(a) Use Lagrange polynomial to find one root of $\cosh x + x - 3 = 0$

(b) Deduce the form of Newton's divided difference low where

$$F[x_{i+1}, x_i] = \frac{y_{i+1} - y_i}{x_{i+1} - x_i} \quad \text{and} \quad F[x_{i+2}, x_{i+1}, x_i] = \frac{F[x_{i+2}, x_{i+1}] - F[x_{i+1}, x_i]}{x_{i+2} - x_i}$$

(c) From the following table find

x	0	0.5	1	1.5	2	2.5	3
f(x)	2	2.7	3.1	5.2	7.2	9	11

(i) Find f(0.21), f(1. 1) and f(2. 55)

(using Newton's and Stirlling methods)

(ii) $D_{2,2}$ (Ricardson extrapolation) where $D_{1,1} = f'(1)$

(iii) $f'(1)$, $f''(1)$, $f'(0.1)$ and $f''(0.1)$

$C_0 = y_0$

$\frac{y_0}{y_1}$ $\frac{C_0(X - X_0)}{C_1(X - X_1)}$

$y_1 - y_0 = C_1$

$y_1 - y_0 =$

Q (2) (25M)

(a) Deduce the form of truncation error and the form of trapezoidal integration rule.

(b) Find an approximate value of $\int_0^2 e^{x^2}\,dx$ by using

(i) Trapezoidal rule (ii) Simpson rule

(iii) weddle method (v) Find $R_{2,2}$ (Romberg extrapolation)

(vi) Gauss three-pionts

(c) Use Newtons backword formula to derive Adams-Bashfourth two-step method then use it to find y(0.4) , h=0.1 for

$$\frac{d^2y}{dx^2} = 2x + y \text{ where } y(0) = 1 \; , \; y'(0) = 0$$

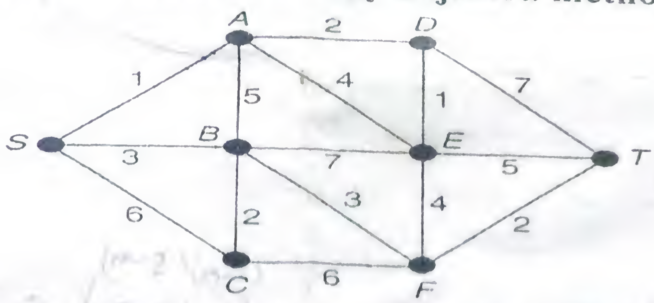
-3.4

Q (3) (25M)

(a) Prove that if G=(V,E) is a simple graph, n is number of edges and m is a number of Vertices then $n \leq \binom{m}{2}$

(b) Show that the number of vertices of odd degree in a graph G=(V,E) always even

(c) Find the short path from S to T by Dijkstra method

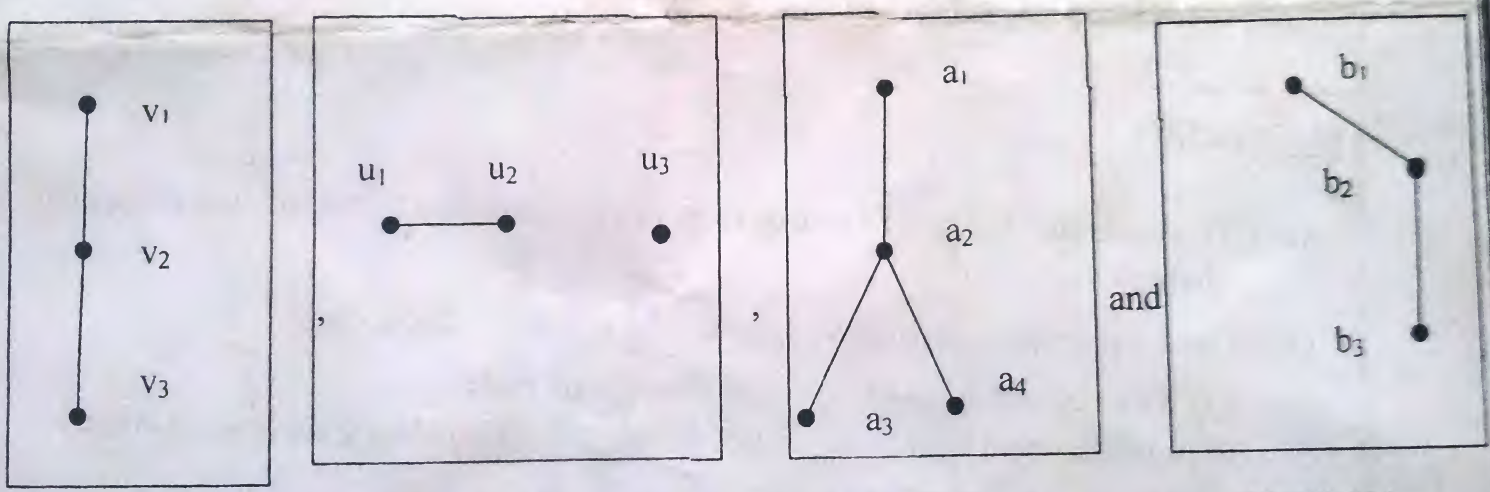


Q (4) (25M)

(a) Consider the graphs G≡(V1,E1), H≡(V2,E2), M≡(V3,E3)and N≡(V4,E4) find. (i) The join graph for G and H(G+H)

(ii) The product graph for two graph M and N (M X N)

(iii) Using the adjacent matrix to show that N=(V4,E4) is connected Where V1 = {v1,v2,v3}, V2 = { u1,u2,u3}, V3 ={a1,a2,a3,a4} , V4 = {b1,b2,b3}



G ≡V_1,E_1) H≡V_2,E_2) M≡ (V_3,E_3) N≡(V_4,E_4)

(b) Decide whether the sequence S: 5, 4,3,3,2,2,2,1,1,1 is graphical by use deletion degree theorem

(c) Show that two graph G and H are isomorphic graphs if degrees of vertices of G and H are same.

(d) Show that in a bipartite graph G≡ (V,E) each cycle in G has even length

With my best wishes Dr: M.Shokry